PR: 4200108341
Page 6 of 8

[redacted]

Technical Specifications

INCA Wave™ 500 WDS system

Detailed Spectrometer and performance specifications:

Spectrometer

Fully focusing spectrometer using 210mm Rowland circle and 2θ range of 33° to 135°
Four diffracting crystals on a six position, computer controlled turret, changeable at any position. For analysis of all elements down to B (Z = 5)

Diffracting crystals are:

Crystal	2d, nm	energy range, keV	Type
LiF	0.40267	10.84 - 3.33	Johansson
PET	0.8742	4.99 - 1.54	Johansson
TAP	2.575	1.70 - 0.52	Johansson
LSM80N	7.8	0.56 - 0.17	Johann

- 2θ drive system for positioning crystals and detectors along the Rowland circle
- Crystal change with change motor mounted directly to crystal turret
- Reproducibility of wavelength position ±0.000014nm
- Linearity of wavelength position ±0.0002nm
- X-ray detectors consisting of one flow proportional and one sealed proportional counter mounted in tandem
- Slit size motor for controlling width of receiving slit (0.01-2.50 mm in 0.01mm steps) located in front of x-ray detectors
- Slit position motor for positioning slit and detectors with respect to x-rays diffracted from crystal and optimizing x-ray collection for each spectral line.
- SEM chamber interface (see configuration guide for availability)

Spectrometer control unit

- 400Mbit IEEE 1394 serial communication
- Motor drives for wavelength position, slit size, slit position, crystal, and on most systems, gate valve
- Fully automatic detector calibration
- Pulse height analysis using multichannel analyzer
- Amplifier gain programmable from 1X to 127X
- Single channel analyzer with programmable control of lower level and window from 0 to 9.99V in 0.01V steps
- Ratemeter, counter and timer
- Specimen current meter for measurement of absorbed current from 0.01nA to 1000nA
- Front panel LED indicators of communication and system health status

System computer:

An INCA system computer meeting the following minimum specifications:

- Compaq EVO D510 profile: convertible mini tower
- Chipset: Intel G845
- Processor: Intel P4
- Speed: 2.4 GHz
- RAM: 512MB
- Hard drive 80GB
- Other Drives: 1 X 3.5 Floppy
  1 X CD-RW (internal)
- Graphics: Integrated Intel Extreme Graphics (32MB equivalent)
- Network: Integrated Intel Pro/100 VM Network connection
- Mouse: PS-2 type

Inca software - general

Navigator
The Advisor™
IMS ™ (Information Management System)
Reporting

PR: 4200108341
Page 7 of 8

[redacted]

Inca Wave contains two navigators: Analyze and Standardize

Project
This step in the process allows the users to:
- Create a new project or open an existing project
- Record important details about the customer for the project e.g., contact addresses and telephone numbers etc
- Make the project available to other users or keep it private
- Record notes about the project in the Project Notes field
- Record appropriate keywords which will help the user to search for this project

Sample
This step in the process allows the users to:
- Start a new sample, enter label and sample identification number
- Record details about the sample e.g., conditions and treatments etc.
- Record sample type
- Record if sample has been polished and coated

Microscope set-up
Automatic beam current monitoring with graphical display
Microscope details are read automatically (depending on SEM model)

Scan elements
Select elements for analysis from periodic table
Choice of sigma level to define presence/absence of elements
Facility to set up favourite element lists
Display of peaks for selected elements
Access to line table editor
Wavelength scans with facility to change slit size/position and scan speed.

Measure elements
Measures peak and background intensities and displays numerically and graphically
Order of element analysis can be defined
Data acquisition can be terminated by time or preset number of counts for each element
Peak search options

Spectrum display and manipulation
The spectrum viewer box is used to display:
- Wavelength scans (across more than one crystal if appropriate)
- Segmented scans from several peaks
- Peak searches
- Peak and background counts
- Horizontal and vertical spectrum zoom by click and drag, mouse wheel expansion of a peak around a cursor

Peak identification
KLM markers can be displayed for all elements, including positions of higher order lines and satellite peaks

Status bar
Continuously monitored display of ratemeter, count rate, absorbed current, wavelength position (Angstroms or keV), crystal, counter status, vacuum status and gate valve status.
Audio facility for ratemeter
Access to direct control

Quantitative analysis
Peak and background counts for unknowns and standards are stored as cps/nA, so analysis can be performed at different beam current from standards.
X-ray corrections for normal and tilted specimens using published algorithms [1,2,3] which have been designed to give better performance for light elements and high absorption conditions.
Processing options i.e., All elements, Combined element by difference and Combined element by stoichiometry
Quantitation results display in tabular, bar chart, or pie chart format

PR: 4200108341
Page 8 of 8

[redacted]

Data Export
Spectra can be copied and exported in many different formats providing users with more flexibility for putting spectra in customized reports easily. The following options are available for copying and exporting spectra:
- Bitmap (.bmp), TIFF (.tif) or JPEG (.jpg) from any window where a spectrum is displayed
- EMSA spectrum export
- Copy a spectrum to the clipboard from any window where a spectrum is displayed

Create Word™Document
The user can create a Microsoft®Word™ document from the INCA Wave report easily with a single button press from within the Report.

Project Export as 'HTML'
The program allows the export of whole projects as web pages for easy publishing of a web site containing the entire project data, images and spectra etc over Intranet or the Internet.

Access to Customer Support/ Oxford World-wide web
Access is available via the Help system (subject to modem and phone line availability). All INCA customers can benefit from a world wide Customer Support Group aimed at helping the customers with any questions they may have regarding the INCA System.
Product information can also be obtained by accessing the Oxford web page via the INCA™ Help system.

Measure standards
Peak search facility
Facility to define interval between restandardizing for each element

Line table editor
Preset conditions for all elements
Flexibility to adjust parameter for special requirements
Operators' own line tables may be used by others, but not changed
Line table editor accessed from menu and easily from Navigator steps

Direct control
Access to all spectrometer parameters including, slit, gain, lower level window, pulse height distribution analysis etc.
Multichannel analyser for pulse height distribution

Calibration
Fully automatic calibration of detectors

System peripherals:
- Hewlett Packard color desk jet printer (or equivalent) for printing images.
- Microsoft Office software suite for ease of reporting.

Installation and warranty:
Installation will be performed by a trained Oxford Instruments Customer Support Engineer. Initial operator familiarization included. Installation includes one year complete parts and labor warranty coverage. Options for extending warranty coverage are available as requested.

The system provides guidance and validation software. The engineer is guided by the Validation software throughout the procedure. At the end of the process, the installation certificate is printed and all the parameters associated with the system are stored and transferred to a floppy disk. The system includes a reply paid envelope so that the engineer can mail back the disk to UK service, which then will have access to all details of each installation.

There is also included, Customer Validation software which allows the customer to initiate a series of automatic tests on all the hardware, including the detector. The printed results can be faxed to an Oxford Instruments engineer.